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Treatment of Infantile Paralysis
by Massage and Electricity

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REPRINTED FROM
THE AMERICAN JOURNAL
OF OBSTETRICS AND DISEASES OF
WOMEN AND CHILDREN
VOL. LXIII, No. 4, 1911

NEW YORK
WILLIAM WOOD & COMPANY, PUBLISHERS
1911

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TREATMENT OF INFANTILE PARALYSIS BY MASSAGE AND ELECTRICITY.*

BY
HENRY W. FRAUENTHAL, A. C., M. D.,
New York.

(With thirteen illustrations.)

My deductions as to the great value of electricity and massage as remedial agents in the paralyses following poliomyelitis are drawn from an experience during the past four years in the treatment of over 1,100 cases, most of which have been seen at the Hospital for Deformities and Joint Diseases. These deductions differ from statements in medical writings, and are from practical experience, not library visions and theories.

In the employment of physical methods, we must know when to begin, what methods to prefer, how long, and at what intervals to use them, and in what strength or intensity, for like chemical therapeutics, what may be a medium for great good may also be an agent for much harm.

Judging from many articles written condemning the use of electricity and massage, one is led to believe the statement of the late Dr. Lewis A. Sayre, "What doctors do not understand, they are apt to oppose."

After an extended review of medical literature, I have failed to find any detailed descriptive method of the use of electricity and massage in infantile paralysis, so if you will bear with me I will describe what I consider to yield the best results.

When should electric treatment begin, and what form of current should we use? Many writers advise waiting from four to six weeks after the temperature becomes normal before doing anything in the way of treatment. I have found that we obtain the best results by beginning when paralysis appears and even before the temperature is normal.

I have found that in the application of the Oudin or d'Arsonval high frequency current in cases of obliterating endarteritis, that the skin became blanched and remained so for several minutes, showing that the primary effect of the high frequency

* Based on the records of the past four years of the Hospital for Deformities and Joint Diseases.



is a contraction of the blood-vessels. With this effect in view, hoping to reduce the blood and serum compression on the nerve cells in the spinal cord, I have in the first few days of the paralysis applied this current along the spinal column, and feel positive that I have relieved the compression in the cord and hastened recovery. I will cite one case.

CASE A.—Gertrude G.; six years of age; normal delivery; previous history not pertinent.

I was called by Dr. Brainglass to confirm his diagnosis of infantile paralysis, on June 13, 1910. Sister of the patient had had the disease with facial involvement.

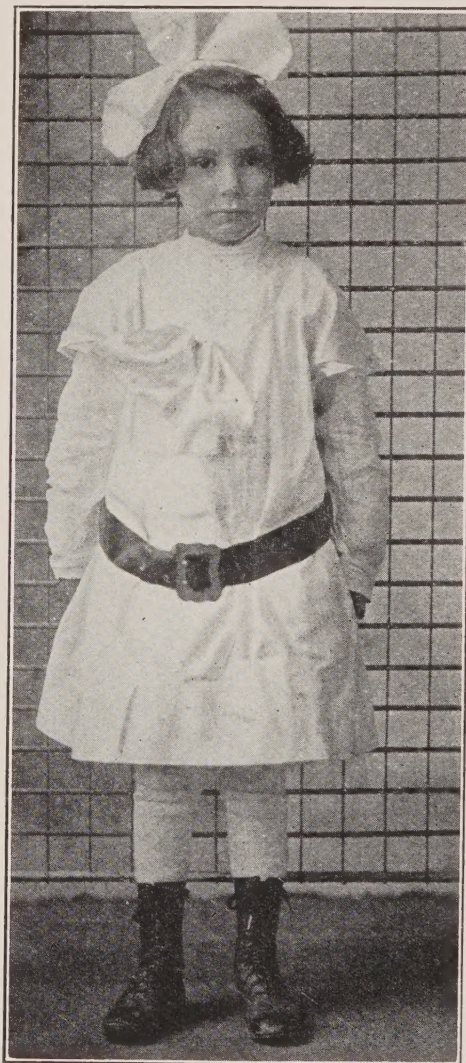


FIG. 1.—CASE A. Gertrude G.

When I saw this child both legs were involved; the paralysis extended up the spine, and seemed to be of the progressive type. Hoping to stay the advance of the paralysis and expedite a recovery, having explained to the doctor the benefit I hoped to obtain by the d'Arsonval current, and receiving the concurrence of the family, I had the child removed to the Hospital for De-

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formities and Joint Diseases where, after the first two days treatment with high frequency along the spine, particularly over the lumbar region, a marked improvement in the child's condition was shown. This treatment was kept up and combined with the other treatment of massage and electricity as herein described.

The child has made an almost perfect recovery; can bear her weight and hop on either leg, and walks with a normal gait.

When the temperature is between 98.5° and 99.5° and in some cases where high temperature continues for several weeks, I have not let this deter me from treating the patient.

I give to the muscles involved a sinusoidal current, alternating with a combined galvanic and faradic current that contracts seventy-two times to a minute, synchronous with the heart beat (such a clock arrangement is found on Victor electric plates, and others); and I personally regard this as an aid in the effect.

We know that we can obtain contraction of the muscle by means of electrical current, when none can be obtained by the will, hence this is a valuable means of retaining and developing the muscle fiber until it comes under the guidance of the mind.

Although many differences of opinion prevail as to the application of the sponge electrodes, I am in the habit of applying them at the origin and insertion of the muscle or muscle groups involved, always laying stress on the importance of approximating the origin and insertion of the muscle as nearly as possible.

For instance, in treating the perineal group, these muscles being most frequently involved, one sponge is placed over the middle third of the outer side of the fibula, the foot flexed as much above a right angle as possible, and the other sponge applied over the insertion of these muscles on the outer side of the foot. In this way the bellies of the muscles are relaxed and a contraction is made more easily.

I believe much foolish stress has been laid upon the reaction of degeneration, and I wish to prove, from a large practical experience, how deceptive it may be.

It is said that a failure to obtain a muscle contraction by a galvanic or faradic current is an evidence of degeneration of the muscle fiber and that no improvement can be looked for in this paralyzed condition in the future.

Do we fail to obtain a contraction in most cases? No! We find that the cutaneous surface will not tolerate the pain of the current and we must desist before contraction takes place, for most of our cases occur in children under five years of age, and they see no reason for enduring the electrical pain. This is even

true in other cases, when the age of the patient and his cutaneous tolerance is greater; the strong currents may give no reaction and still reappearance of function may occur.

CASE B.—This case, with Cases C, D, E and F are shown to correct two long established fallacies.

One, that no improvement will occur whether spontaneous or under treatment after one year; many say six months.

The other, that after failure to react to either the galvanic or faradic current, known as the reaction of degeneration, no improvement can be looked for.

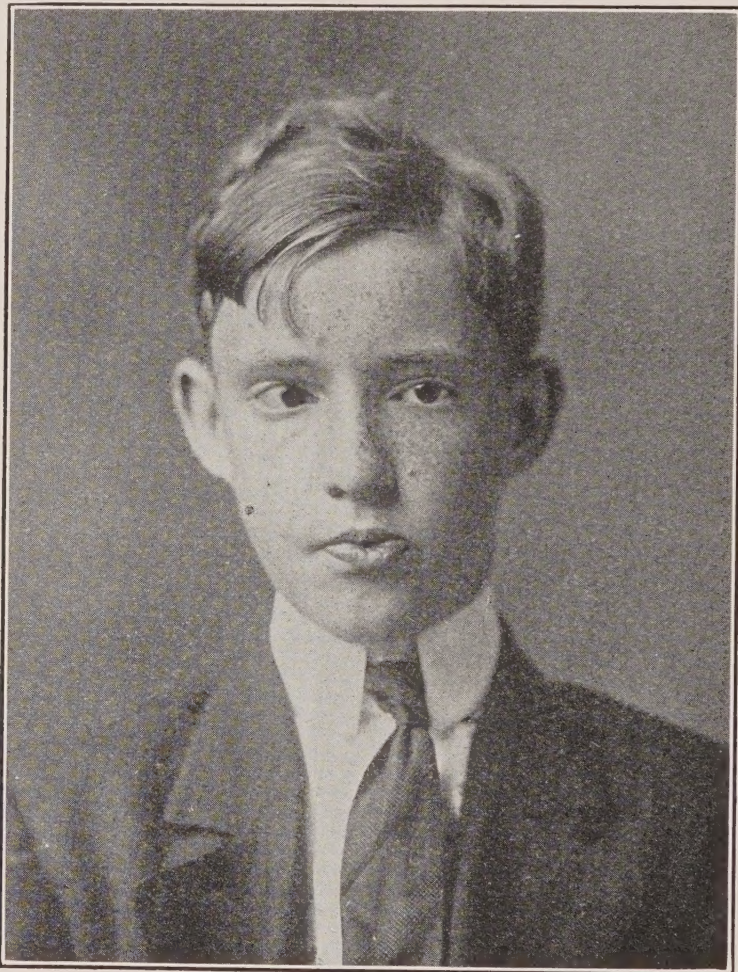


FIG. 2.—CASE B.

Frank S.—Boy, sixteen years old; when one and a half years old had an attack of infantile paralysis involving his face and arm; fourteen years after this attack appeared at the Hospital for Deformities and Joint Diseases, hoping to receive treatment that would improve the condition of his face. He was turned over to Dr. Chas. Rosenheck, who had had five years' experience at the Roosevelt Hospital dispensary (department of neurological diseases) and also at the Harlem Hospital dispensary (neurological department), and who reported to me that he was satisfied that his reaction of degeneration was such as to be

beyond all hope of the slightest benefit. I requested the other members of the staff to confirm this condition, as I wished to see if, after the lapse of fourteen years, with a positive reaction of degeneration, any improvement could take place. The improvement was so great after being under constant treatment for six months (the boy being able to close eye and produce wrinkles in his forehead, with a return to the normal outline of the affected side of his face) that he was shown at the Pediatric, Neurological, Orthopedic, and other sections of the Academy of Medicine. Many other similar cases have been encountered.

Many other cases of from five to ten years' standing are in the records of the hospital, with equally satisfactory results.

The strength of the current used should be the weakest that will produce contraction, and it is never to be used after contraction of the muscle ceases, nor longer than from two to three minutes on any particular muscle group, or from six to ten minutes on the body at one seance.

If this method is followed the child will not cry from pain, or have its nervous system upset by too long continued electric treatment.

Medical massage dates from the work of Dr. Metzger, of Amsterdam, and his followers, and his classification in a great measure still prevails.

1. We have the passive movements which are given to the patient by the operator.

2. Active movements made by the patient with the assistance or resistance of the operator.

The following are the manipulations:

1. *Effleurage* consists of a centripetal stroking by means of the inner side of the thumb and first finger and the space of the hand intervening, milking and pressing the blood and lymph from the extremities toward the body.

2. *Frictions* are given with the thumb or the tips of fingers; they are strong, circular manipulations and are always followed by centripetal stroking.

3. *Petrissage* (kneading); this manipulation is performed by the tips of the thumb or the palm of the finger; it is used principally on the extremities.

4. *Tapotement* (percussion) is divided into five kinds:

- a. Clapping, which is performed by the palm of the hand;
- b. Hacking, with the ulnar border of the hand;
- c. Punctation, with the tips of the fingers;
- d. Beating, with the clenched hand;

d. Vibration, as the friction of the vibrator.

Zabludowski has shown that muscles regain their aptitude for work much more quickly by a few minutes of massage than by rest for a longer time.

Dr. Benjamin Lee ("Hare System of Practical Therapeutics," vol. ii, page 321) states "In the essential paralysis of infancy, truly wonderful results are obtained by massage."

The treatment should be entered upon the moment the acute inflammatory symptoms have disappeared and be continued daily in the face of seeming absolute ineffectiveness, for weeks and even months. Cases in which no improvement can be detected for long periods often suddenly begin to improve and progress with great rapidity.

The effect of massage may be arranged as follows: Mechanical, reflex, thermal, electrical.

1. The mechanical effects are by far the most important (but the others should not be overlooked or forgotten). They consist of the interchanging of cell contents under the influence of alternate pressure and relaxation; a quickened movement of the blood in the capillaries, especially in the muscular tissue; increased activity in the movement of the areolar fluid; acceleration of the currents of both blood and lymph in their respective channels.

2. The reflex or purely nervous effects of massage are obtained by light stroking and precussion. The former produces results which can only be explained on the supposition that it acts as a stimulant to the reflex system of nerves, the force used not being sufficient to account for any change on the mechanical theory.

3. The thermal effects of massage and movements are almost too apparent to need scientific demonstration; everyone is familiar with the fact that both muscular contraction in the form of ordinary exercise and simple friction develop bodily heat in a striking degree. Dr. Weit Mitchell, in his essay on "Fat, Blood and how to obtain Them" notes (what has been observed by many others) that he has frequently seen the strangely cold limbs of children suffering with infantile paralysis gain from six to ten degrees Fahrenheit during massage.

4. The electric effect of massage results partly from the development of the surface heat, partly from the surface friction, partly from the attrition of the muscular fibers and cells, partly from the nerve stimulation and chemical action.

Graham observes that muscles give a much more ready,

vigorous and agreeable response to the will and to the faradic current after massage than they did before.

A child suffering from infantile paralysis was introduced; the affected limb having a surface temperature of 70° F., the poles of a battery were applied to a limb, and eleven milliamperes were required to produce muscular contraction; the limb was then massaged and the temperature was found to have risen to 95° F.; the poles being applied at the same points, contractions followed the employment of only five milliamperes. It is evident, therefore, that massage diminishes the resistance of the tissues to the electrical current and increases the electrical contractibility of the muscles.

As some men prominent in orthopedics and neurology have condemned the use of electricity and massage, I have taken one of the most recent articles, as illustrative of this side of the subject; *i.e.*, Dr. Henry Ling Taylor (Professor of Orthopedic Surgery, New York Post-graduate School and Hospital, Adjunct Attending Surgeon, Hospital for Ruptured and Crippled, *Medical Record*, October 15, 1910, page 660) says, "The conventional treatment by electricity and massage is completely ineffectual." To further support this position, he continues, "This was publicly acknowledged by Dr. Bernard Sachs of New York, a distinguished neurologist, etc., and chairman of the Collective Investigation Committee of the New York epidemic of 1907, at the Congress of American Physicians and Surgeons, at Washington.

May 10, 1910. In these words he spoke of electricity and massage: "I consider that the time given to massage and electricity, in these cases, is time wasted. I cannot see that these same methods do any definite good."

It is true that Dr. Sachs made the above statement in May, 1910, as I was present at the time; but five months later, on October 24, 1910, at the New York Academy of Medicine, Dr. Sachs, in discussing this subject, spoke of electricity and massage in the highest terms, as he had previously done in the *Journal of American Medical Association*, October 22, 1910, page 1465; thus showing that a man of the highest standing, from a later and more comprehensive knowledge of the subject, completely changed his views of the value of electricity and massage,—a striking illustration of the old adage, "wise men change their minds."

That Dr. Taylor is unconsciously in accord is shown on the next page of his own article, where he speaks in the highest terms of vibration (which is a simple mechanical massage) and active

and passive movements (which have always been classed under Swedish massage).

In support of this treatment, in the Bulletin of the Massachusetts State Board of Health, on infantile paralysis, 1909, Drs. Bradford, Lovett, Brackett, Thorndike, Soutter and Osgood, in speaking of the treatment said:

"Electricity.—The different forms which may be used for this are the galvanic, faradic, static and high frequency currents. In the early stages galvanism should be used on the nerve trunks and faradism on the muscles, so long as their irritability for contraction is maintained. When the irritability of contraction to the faradic is lost, galvanism should be used, as having more influence on nutrition. With the returning muscle irritability, faradism should be used, and best by the use of the electrodes over the muscle points so as to obtain actual contraction of muscles rather than by the application of the electrical current to broad surfaces. This serves as a distinct exercise to the muscle during its early stage of weak contraction. High frequency and static electricity can both be used for their influence on nutrition rather than for their direct action on muscle contraction. It may be stated, in this connection, that the main dependence for actual results must be placed upon the galvanic and faradic currents.

"Massage and Mechanical Therapeutics, etc.—These constitute another means of artificial stimulation, both of nerve and muscle, particularly in their effect upon the circulatory changes. The physiotherapeutic methods are less generally applicable, demanding apparatus for their use, but massage should be given the highest place in all stages of this affection. In conjunction with massage, however, it is wise to reiterate the caution that it is necessary not to rely upon massage alone but that this means should be regarded as an adjunct only to the other forms of muscle and nerve stimulation. Too frequently has it been remarked that massage alone is used to the neglect of many of the other means fully as important."

I am personally convinced that I have seen several cases whereby giving electricity too strongly or for too long a time had done decided harm.

This is also true of too prolonged massage treatment. To illustrate this I will cite two cases.

L. H.—Bethlehem: Child had a very severe attack of infantile paralysis, involving the extremities, back, abdomen and chest muscles, with total exhaustion and all muscles flaccid; he

received massage for an hour and a half, or more, daily, with no improvement, but great exhaustion followed. The child has improved decidedly under more rational treatment of massage and electricity.

Case referred by Dr. Taggart of Atlantic City: Child had involvement of left leg and arm. Treatment was given for one hour three times a day. A strong healthy man finds massage, which is applied over the whole body for an hour, a physical tax. What must three hours' treatment a day mean to muscles devitalized by the lost nerve supply of infantile paralysis.

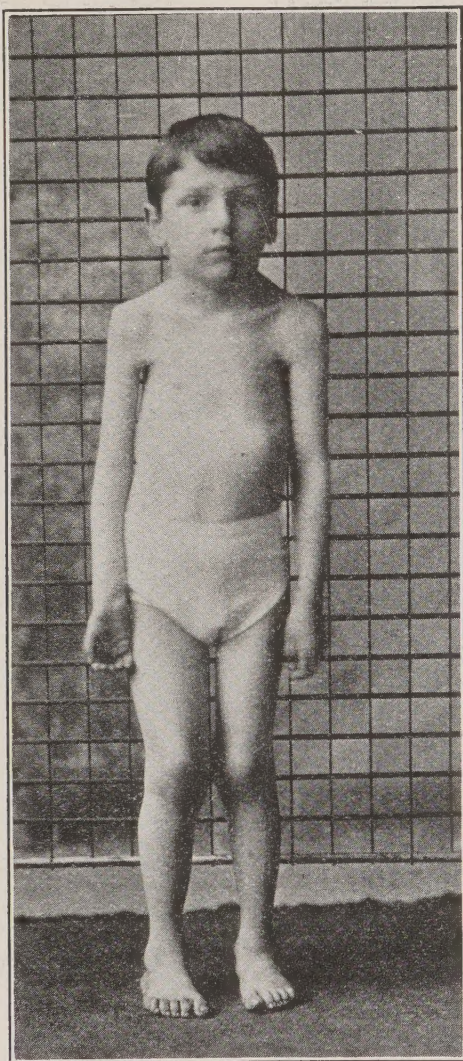


FIG. 3.—CASE C.

Referred to the Hospital for Deformities and Joint Diseases, by Dr. Koplik, seven months after initial paralysis. When admitted, all the muscles were flaccid; child had no use of arms or legs; all muscles of respiration including diaphragm and muscles of neck were involved.

Under massage and electricity, the muscles of both legs have regained their normal function; nearly all function has returned to the left arm; function of the right deltoid is absent, but the trapezius and flexors of the hand have regained their function. There has been some atrophy of the pectorals and apparently some of the intercostal muscles, as shown in the picture.

When the child was admitted to the hospital, we looked forward to obtain an autopsy. The extreme condition of this child makes the amount of recovery almost remarkable.

In conclusion, I wish to recall some salient points.

1. Treatment should begin immediately after paralysis appears, but should be mild in the beginning.
2. The application of high frequency over the spinal column by its contracting action relieves the compression on the nerve cells in the cord by the extravasated blood and serum.



FIG. 4.—CASE D.



FIG. 5.—CASE D.

Represents a type of recovery partial in the one leg, with promise of a flail leg in the other.

D.—Paul E.: Seen in consultation and referred by Dr. Chas. G. Kerley, on October 16, 1910. No spontaneous resolution had taken place in the right leg, and apparently from his muscular condition, he gave no promise of improvement, while the other leg had very little ability to perform the normal motions, much less bear his weight.

The child had been ill since the end of July, 1910, with no spontaneous resolution; very little was looked for in the way of improvement. With Dr. Kerley's concurrence, he was removed to the hospital. As shown in the picture, after three months treatment, he is able to stand alone in braces; is able to lift both limbs, at an equal or right angle; bear the additional weight of the braces, and I am looking for progressive improvement.

3. That even though we fail to obtain apparent muscular reaction by the galvanic or faradic current, we can prevent muscle atrophy by these currents and by the sinusoidal and high frequency, and win a victory from what seems positive defeat. This I have proven in over fifty cases, who have had previous treatment from one to three years, in other institutions, without the ability to walk, or an ability to use their arms. Many of



FIG. 6.—CASE D.



FIG. 7.—CASE E.

E.—Arthur H.; after initial attack received four months treatment at one clinic, eight months treatment at another clinic, and on going to the third clinic, an operation for fixing the foot and ankle was suggested, as apparently there was extensive atrophy and no function.

At that time she (Mrs. H.) met the mother of a patient, who had had her child for treatment at the second institution for three years, with no ability to stand or walk, and Mrs. H. was informed by her that under treatment at the Hospital for Deformities and Joint Diseases for five months, the child was able to walk without braces. Mrs. H., regarding this as an absurdity, made a special visit to the child's home, and seeing what she regarded as a miracle, brought her child.

This child was under treatment for seven months before he gained any promise of bearing his weight on his right leg, and after one year, he is able to walk with almost normal gait.



FIG. 8.—CASE F.

This case is shown to illustrate how massage and electricity, carried out by the parents alone, has won success, when many prominent physicians, who were consulted from time to time, made the darkest prognosis, with no promise of the use of either limb.

Olive B.: When one and a half years of age had an attack of infantile paralysis, with both limbs involved; patient was not able to bear her weight on either limb for two years. During this time, various physicians were consulted, and the mother was told that the case was hopeless. At the advice of an old physician, the mother herself purchased a battery and gave the child massage and electricity. At a later time, braces were ordered by institutions and applied, but as the mother thought that this did not aid in the recovery, they were discarded.

Nevertheless, the mother proceeded in the massage and electricity, keeping up the treatment almost daily for twenty years. The girl, as I now present her, is twenty-four years of age; has no difference in the length of her legs, but the right foot is an inch and a half shorter than the left. She is just recovering from a corrective operation on this right foot.

I am particularly pleased to show this case, in order to demonstrate the perseverance of a parent, recognizing the improvement derived from the treatment, in opposition to the advice of many physicians that she consulted, also the advice she received in a number of institutions, showing how much could be done by the love labor of a parent.

these cases have been shown at the section meetings of the Academy of Medicine.

4. The electric current should be the weakest that will produce a muscular contraction, and should not be continued in weak muscles when contraction ceases.

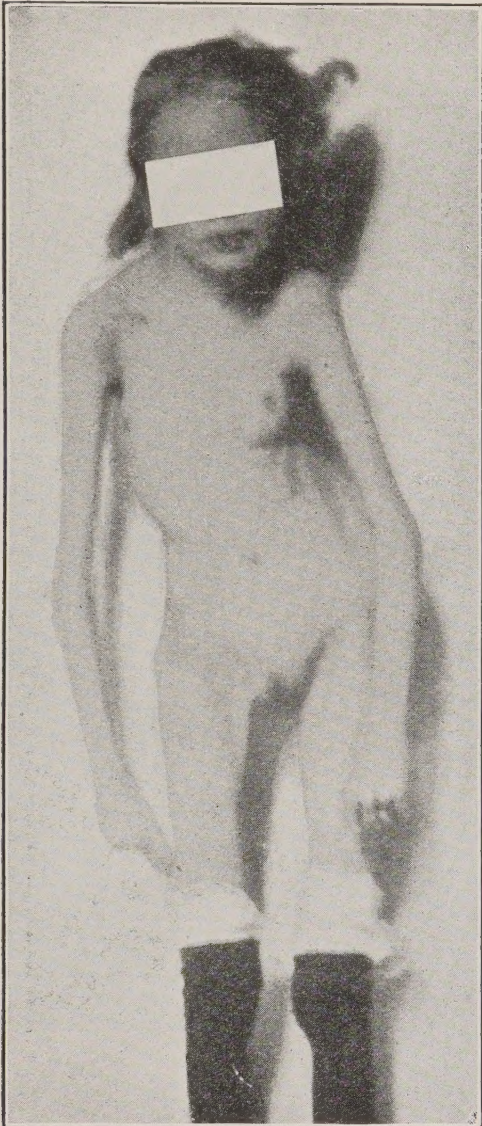


FIG. 9.—CASE G.

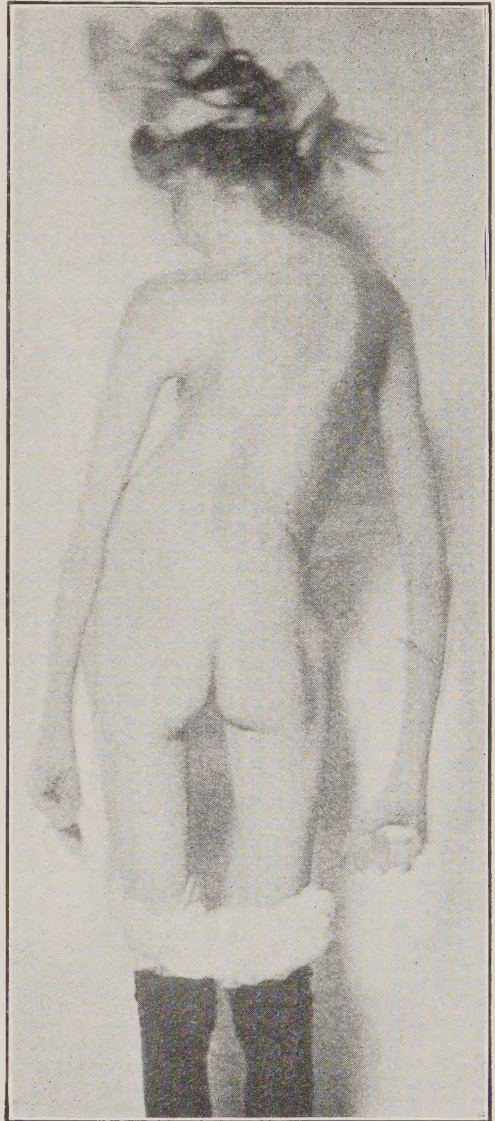


FIG. 10.—CASE G.

M. T., referred to the Hospital by Dr. Reginald H. Sayre, who took the original photographs, X and Y.

This case suffered from a severe attack of infantile paralysis in the epidemic of 1907. The original diagnosis, from pain, was regarded as one of rheumatism, and this diagnosis was concurred with by consultants. Her total paralysis was not noticed until two weeks after the original attack. After six months, she was referred to an orthopedic specialist, and she journeyed from Yonkers to New York once a week to receive treatment which consisted of electricity. The journey back and forth completely exhausted her for twenty-four hours.

The curvature in her back became so pronounced that a brace was applied. The deformity progressing, another consultation with a second orthopedic surgeon was requested. As a result of this consultation a Calot jacket was applied; was also wearing a brace on her right foot. No improvement was noticed.

5. We should approximate the origin and insertion of muscles when applying electricity.

6. Finally I would call attention to a class of active and passive movements (that are guided by a nurse) done before a mirror, and having the child concentrate its mind on each physical effort. This class of exercises, in children over three years

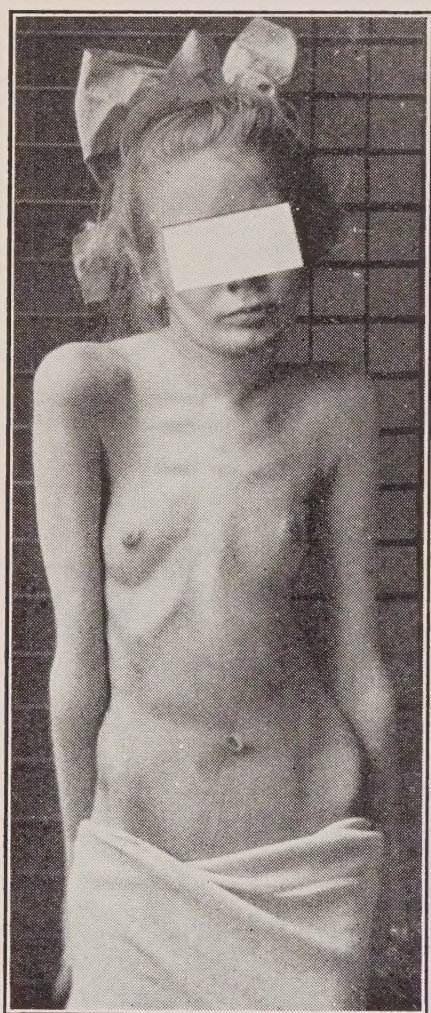


FIG. 11.—CASE G.

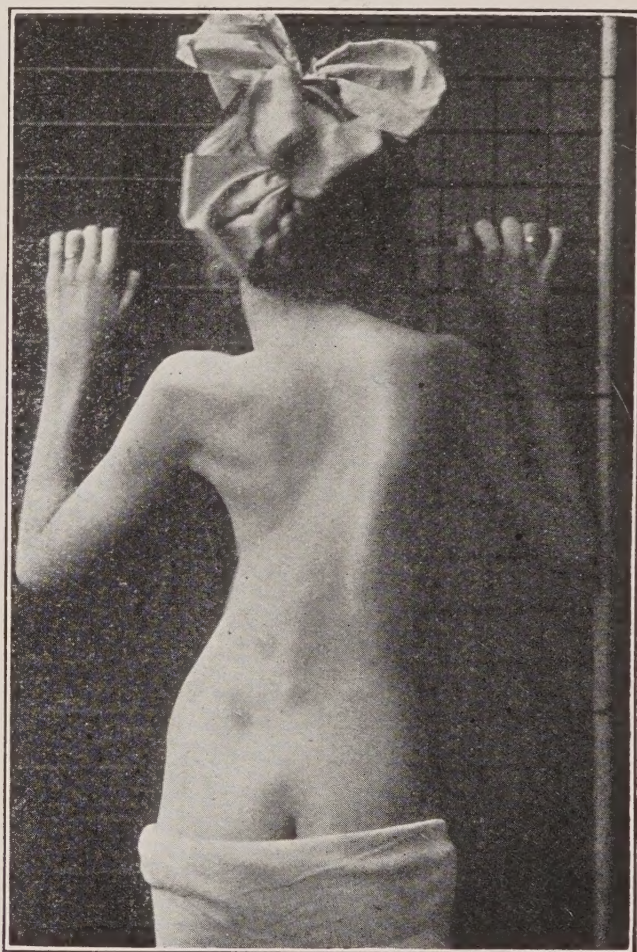


FIG. 12.—CASE G.

Consultation with a third orthopedist was sought. This orthopedist endorsed the treatment as conducted.

In September, 1909, she was seen in consultation by Dr. R. H. Sayre, who recorded her condition in photographs X and Y. Regarding her case as one that should receive aggressive treatment, she was turned over to me, at the hospital, where for three months traction was made on her extremities and head, with daily electricity and massage to her weakened muscles. This was followed by a plaster jacket and jury-mast.

Photographs taken one year later, as shown in X- and Y-, show marked improvement, also demonstrate the fact, not accepted by many orthopedists, that in rotary lateral corvaturæ, with bony deformity, much improvement can take place. A line drawn down from the left nipple in the front, or from the angle of the scapula in the back, or following the crease of buttocks up, will bring out the change that has taken place.

Since these photographs have been taken, the patient has made decided improvement, but objects to having another photograph taken.

of age, has yielded the most brilliant results in my work. As a final summary of my own personal estimation of the relative value of electricity, active muscle education and massage, in the treatment of Infantile Paralysis, it is my opinion that the rating of good accomplished would be 55 per cent. from electricity in

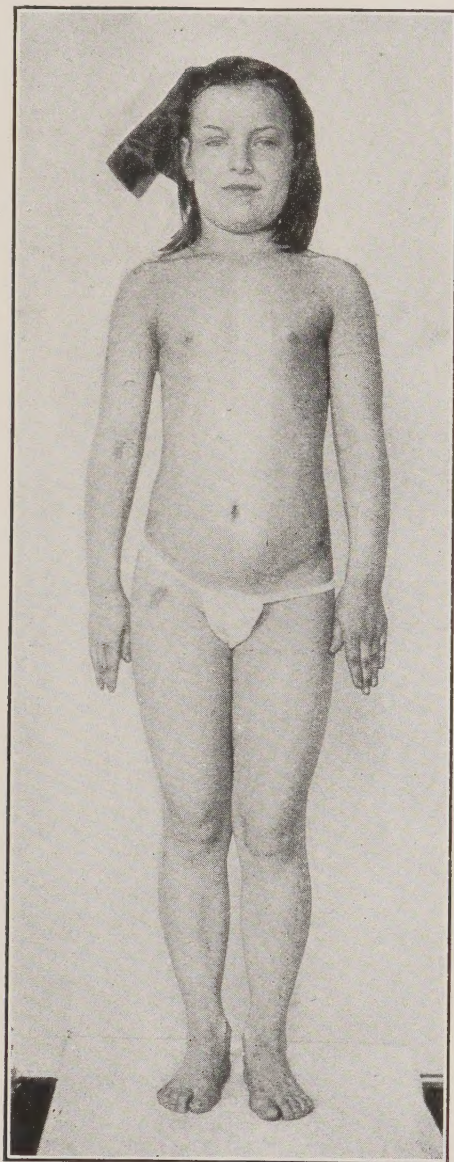


FIG. 13.—CASE H.

This illustrates a case with total paralysis after eight months, which made a perfect recovery under treatment.

its various forms, 25 per cent. from muscle education combined with mental concentration on the physical effort, and 20 per cent. from muscle stimulation by massage.

I hope that in the near future medical schools will give more attention to massage, electricity and other physical therapeutics in their course of instruction.

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THE
AMERICAN
Journal of Obstetrics
AND
DISEASES OF WOMEN AND CHILDREN.

A MONTHLY JOURNAL.

EDITOR IN CHIEF
BROOKS H. WELLS, M. D.

DEPARTMENT OF PEDIATRICS
EDITED BY
THOMAS S. SOUTHWORTH, M. D.



WILLIAM WOOD & COMPANY
PUBLISHERS

Entered as second-class matter Jan. 2, 1906, at the Post Office at York, Pa., under the Act of Congress of March 3, 1879.